



The Inner Workings of **FORTNITE**

Shader-Based Procedural Animations

Fortnite's Vertex Shaders
Introduction : Personal



Name: Jonathan Lindquist
Occupation: Technical Artist
Company: Epic Games
Duties:

- Author shaders
- Generate art
- Write scripts
- Miscellaneous tasks

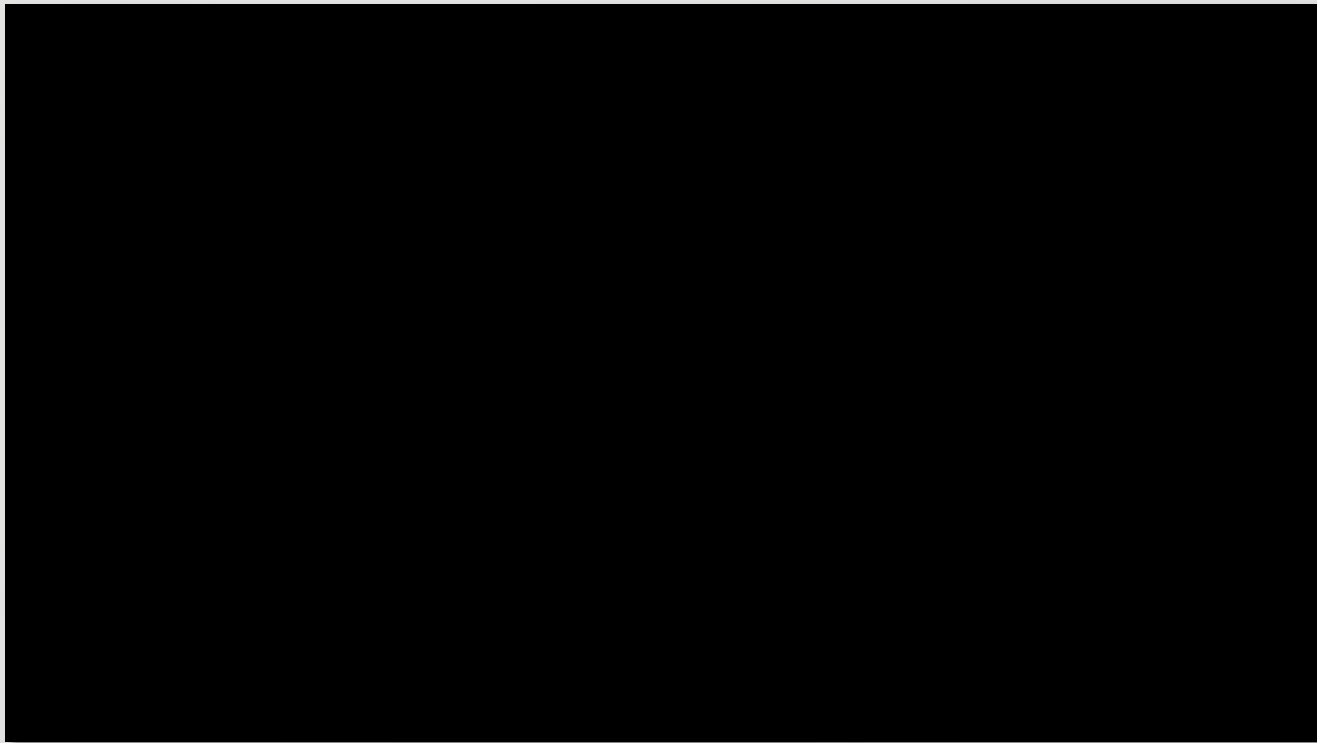
Previous Co.: Raven Software

FORTNITE

- Stylized
- Action
- Co-operative
- Building



Fortnite's Vertex Shaders
Introduction - Project



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- Bounce effects
- Stylized culling
- Self-building player walls
- Conclusion

Fortnite's Vertex Shaders
Bounce Effects



Early Prototype

Fortnite's Vertex Shaders
Bounce Effects

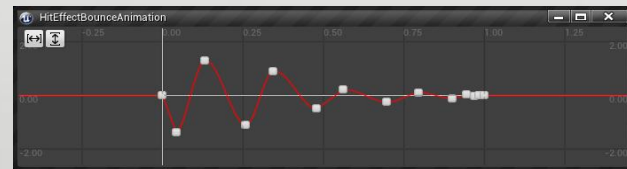
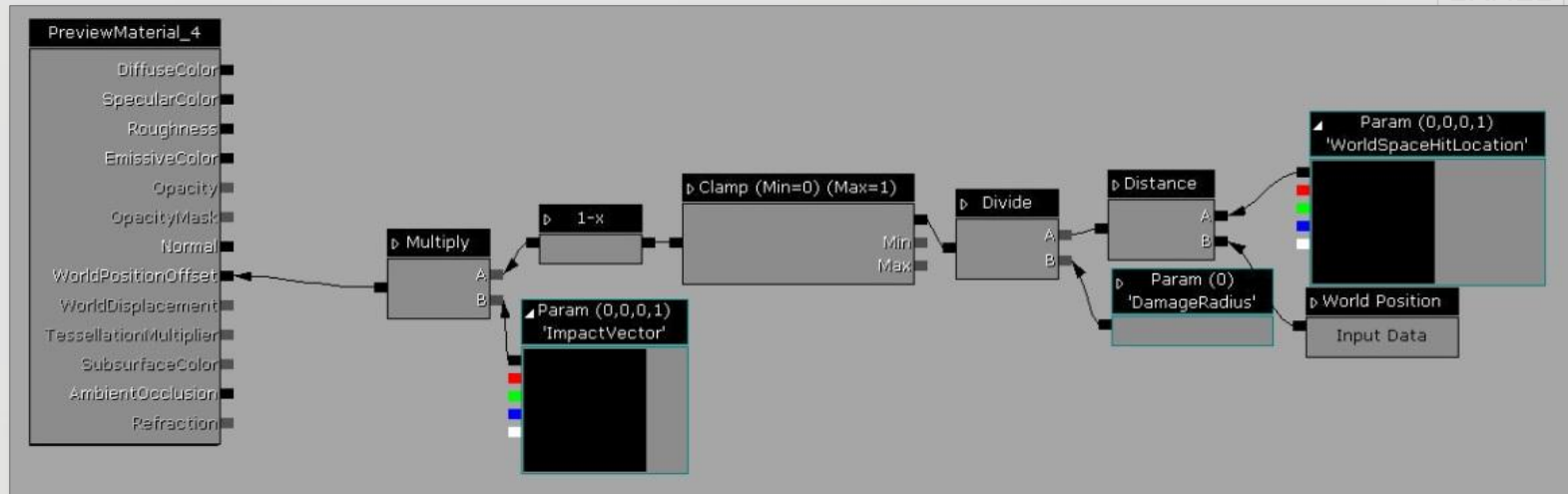


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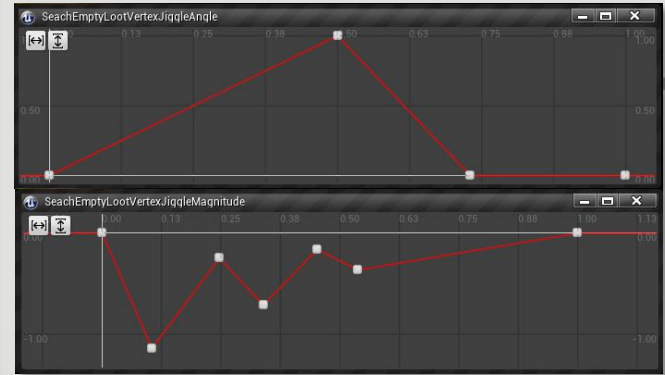
Fortnite's Vertex Shaders

Bounce Effects



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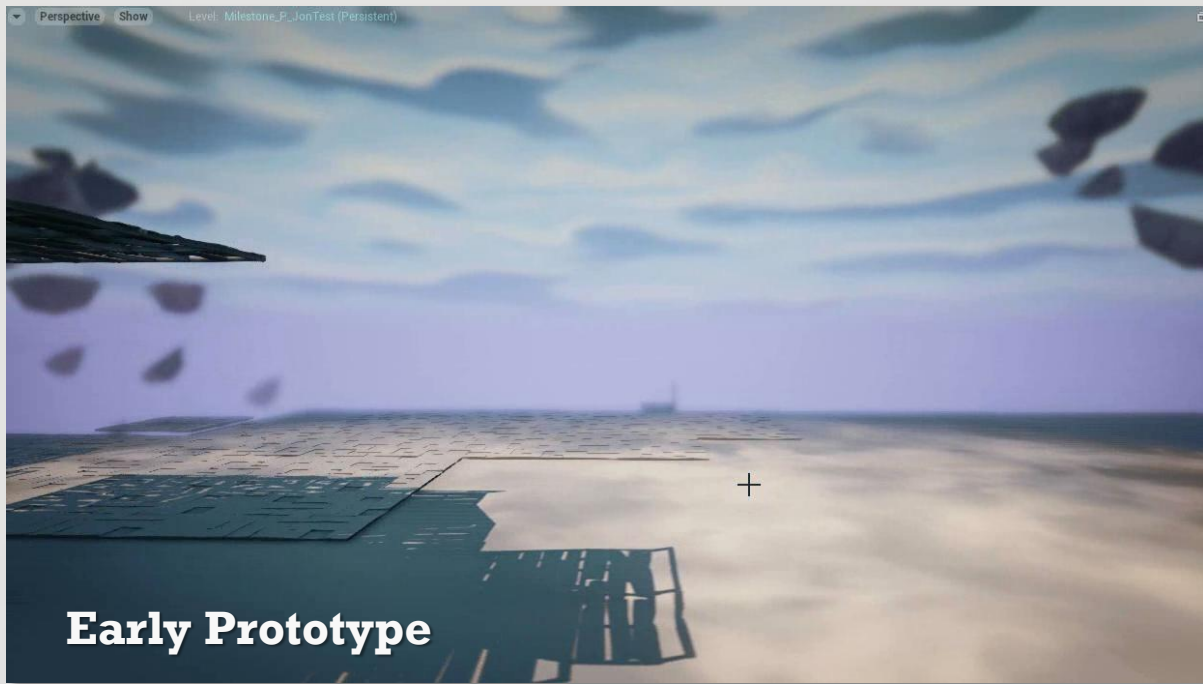
Fortnite's Vertex Shaders Bounce Effects





- **Bounce effects**
- Stylized culling
- Self-building player walls
- Conclusion

Fortnite's Vertex Shaders Stylized Culling



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Stylized Culling

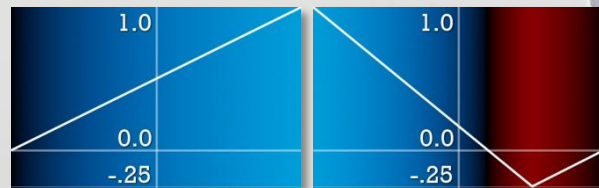
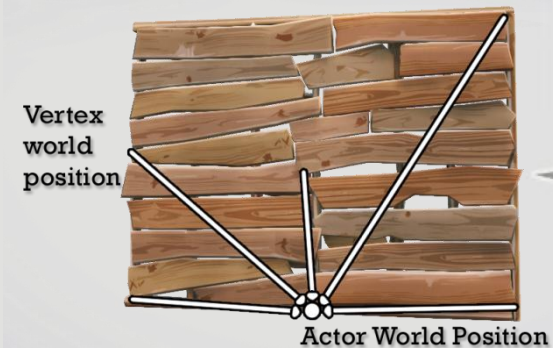
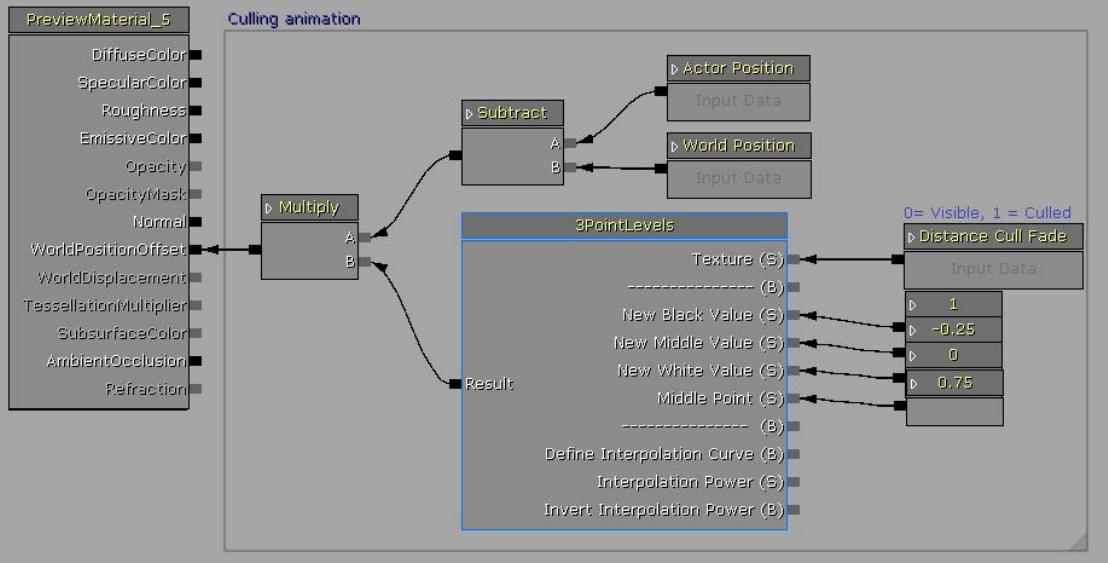


Work in Progress

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Fortnite's Vertex Shaders Stylized Culling





- Bounce effects
- **Stylized culling**
- Self-building structures
- Conclusion

Fortnite's Interactive Effects
Self-Building Structures : Intro





Goals :

- **Build structures in-game**
- Visually indicate structure health
- Create an efficient system

Fortnite's Interactive Effects

Self-Building Structures : Intro



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Fortnite's Interactive Effects

Self-Building Structures : Intro



<http://udn.epicgames.com/Three/PivotPainterTool.html>

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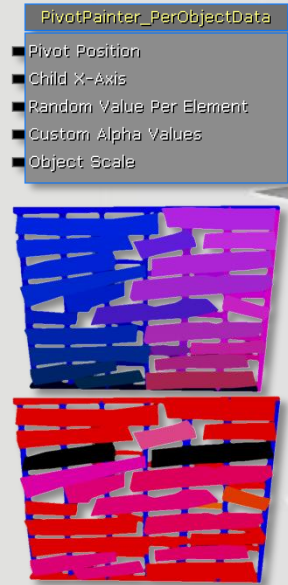
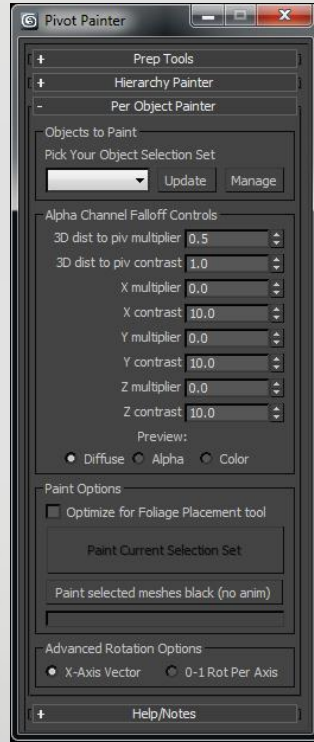
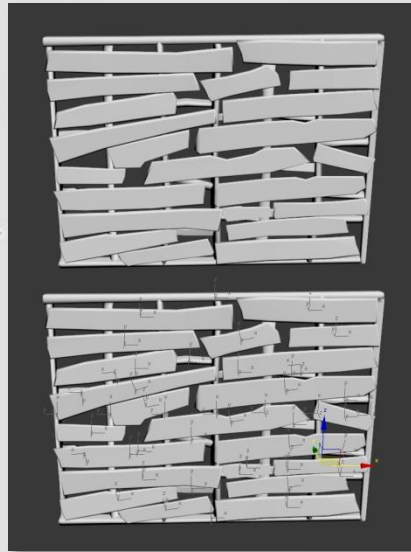
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Self-Building Structures : Scripting



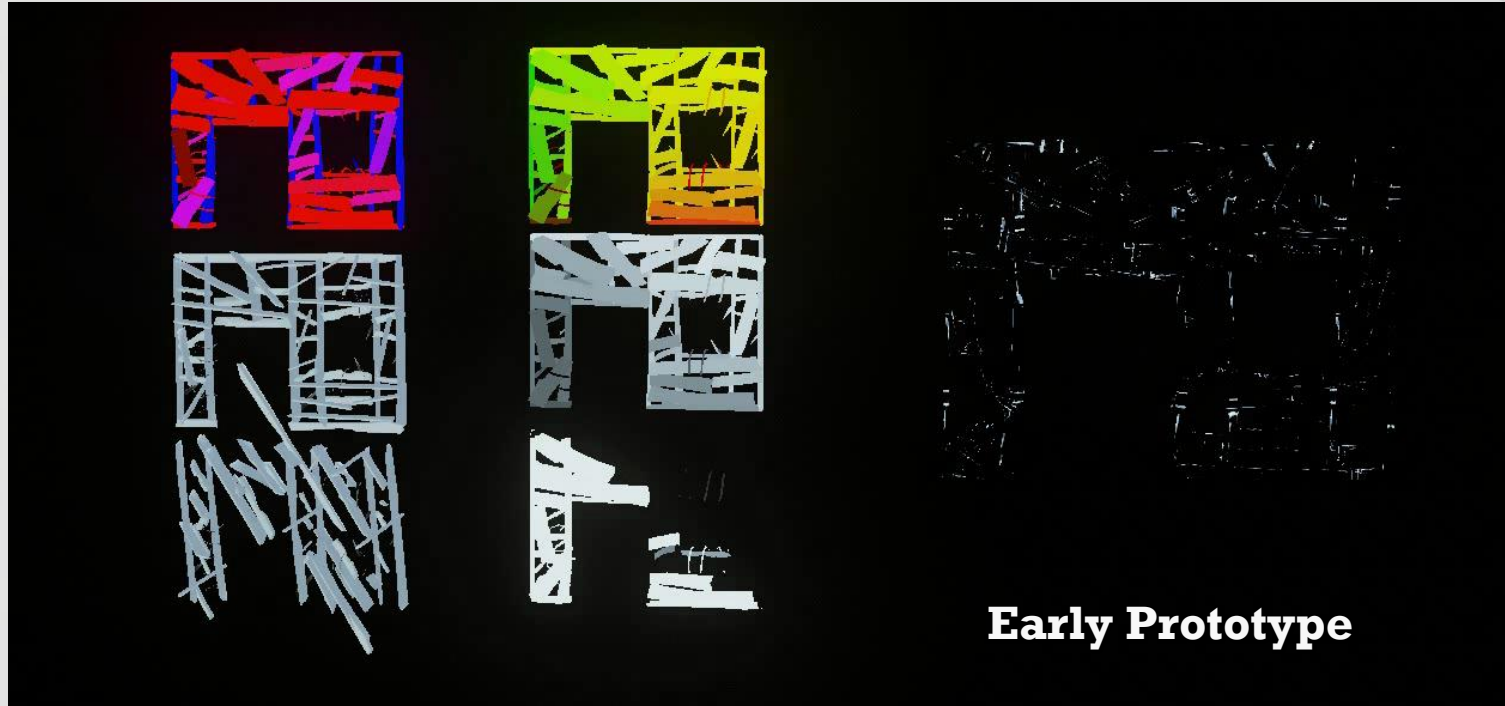
- Scripting
- Model Transformations
 - Translations
 - Rotations
- Animation
 - Secondary motion
- Masking

Self-Building Structures : Scripting



Fortnite's Interactive Effects

Self-Building Structures : Scripting

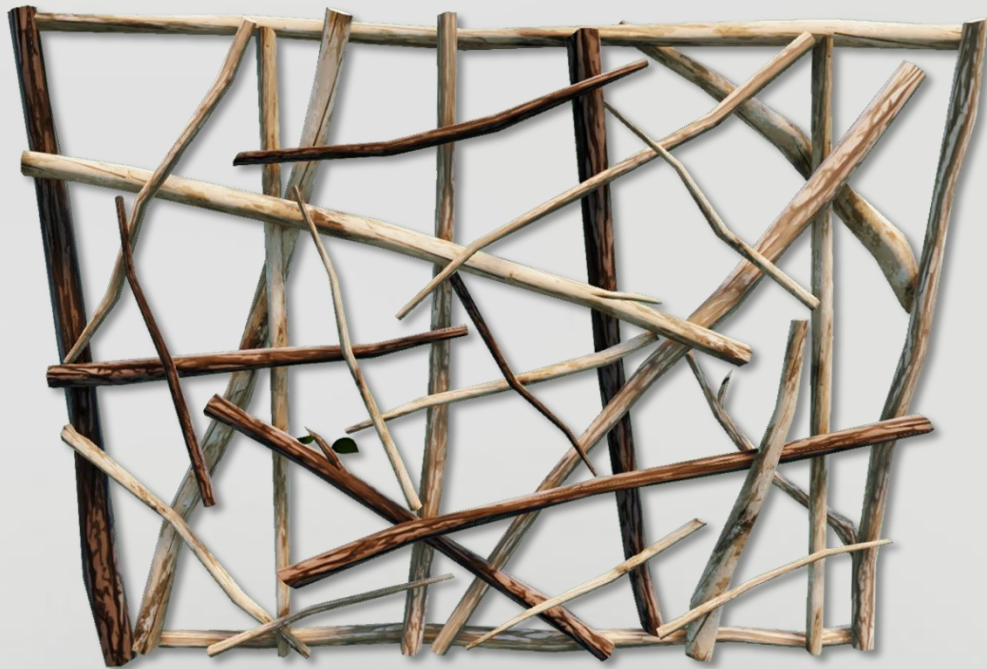


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Self-Building Structures : Scripting

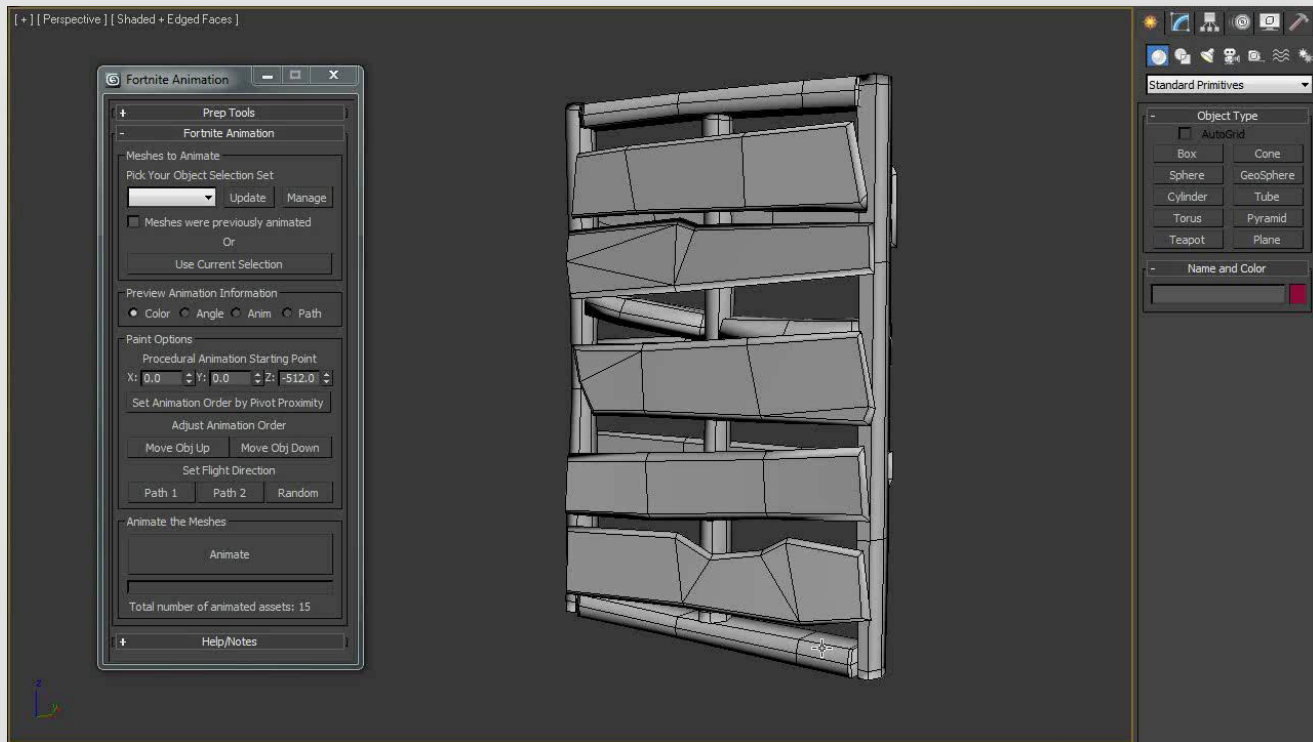


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Self-Building Structures : Scripting





Object Data Stored:

- Random value
- Pivot position
- Axis of rotation
- Animation Order
- 1-bit flight path
- Number of boards



Tips :

- **UV values are inaccurate**
- Avoid unnecessary scripting
- Make debugging assets simple
- Efficient data layout

Self-Building Structures : Model Transformations



- **Scripting**
- Model Transformations
 - Translations
 - Rotations
- Animation
 - Secondary motion
- Masking

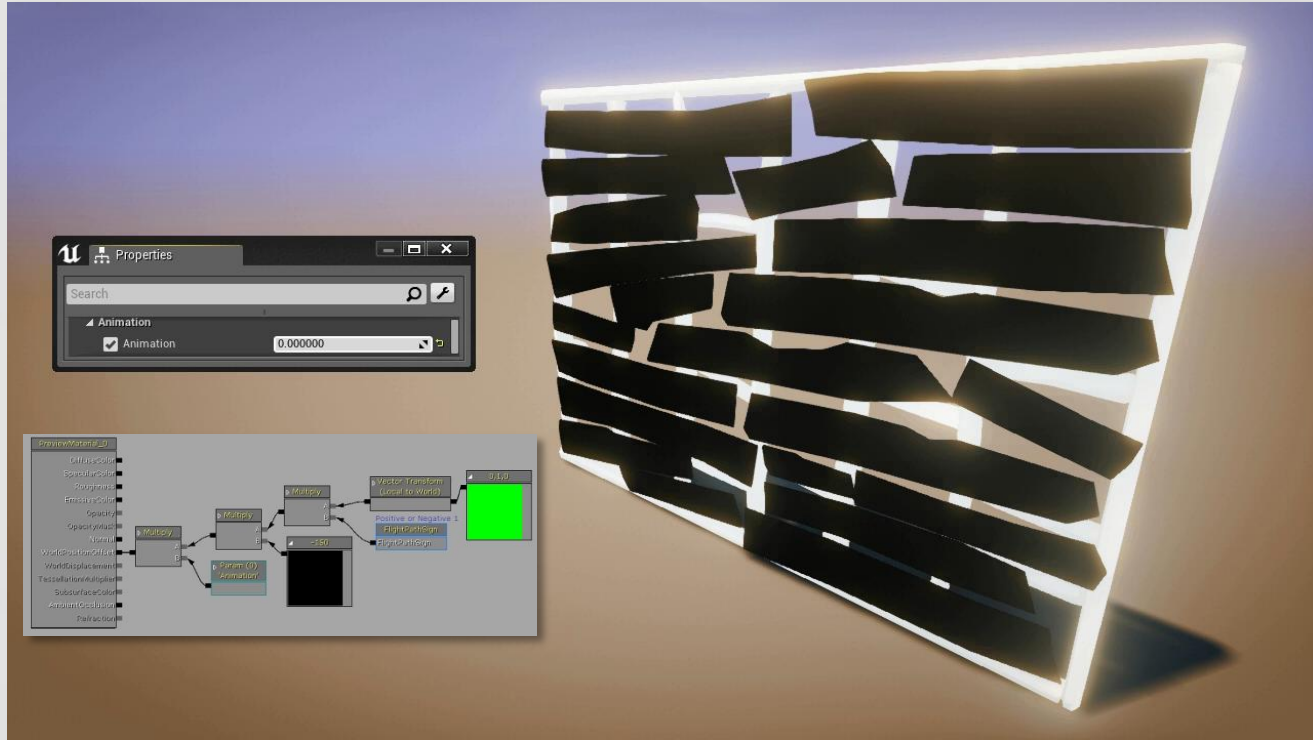
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Self-Building Structures : Model Position Offsets



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Self-Building Structures : Model Position Offsets

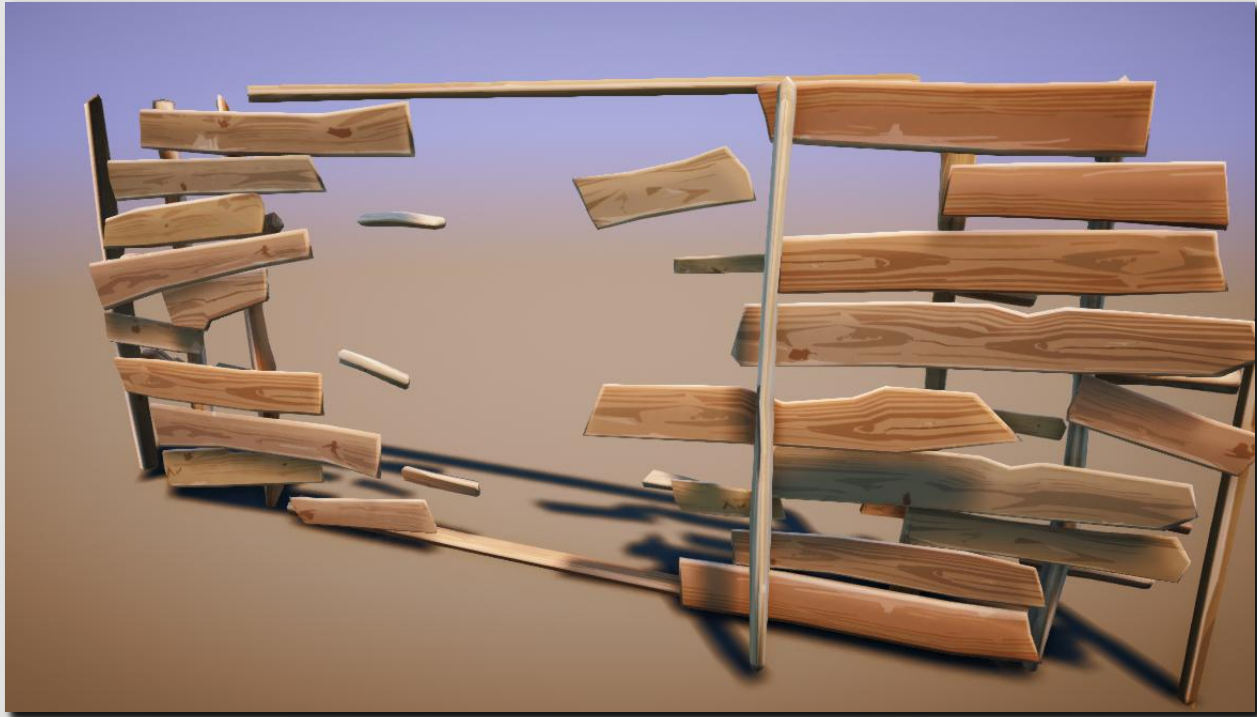


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Self-Building Structures : Model Position Offsets



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Self-Building Structures : Model Position Offsets



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Self-Building Structures : Value Animation Elements



- Scripting
- **Model Transformations**
 - **Translations**
 - Rotations
- Animation
 - Secondary motion
- Masking

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Self-Building Structures : Model Rotation



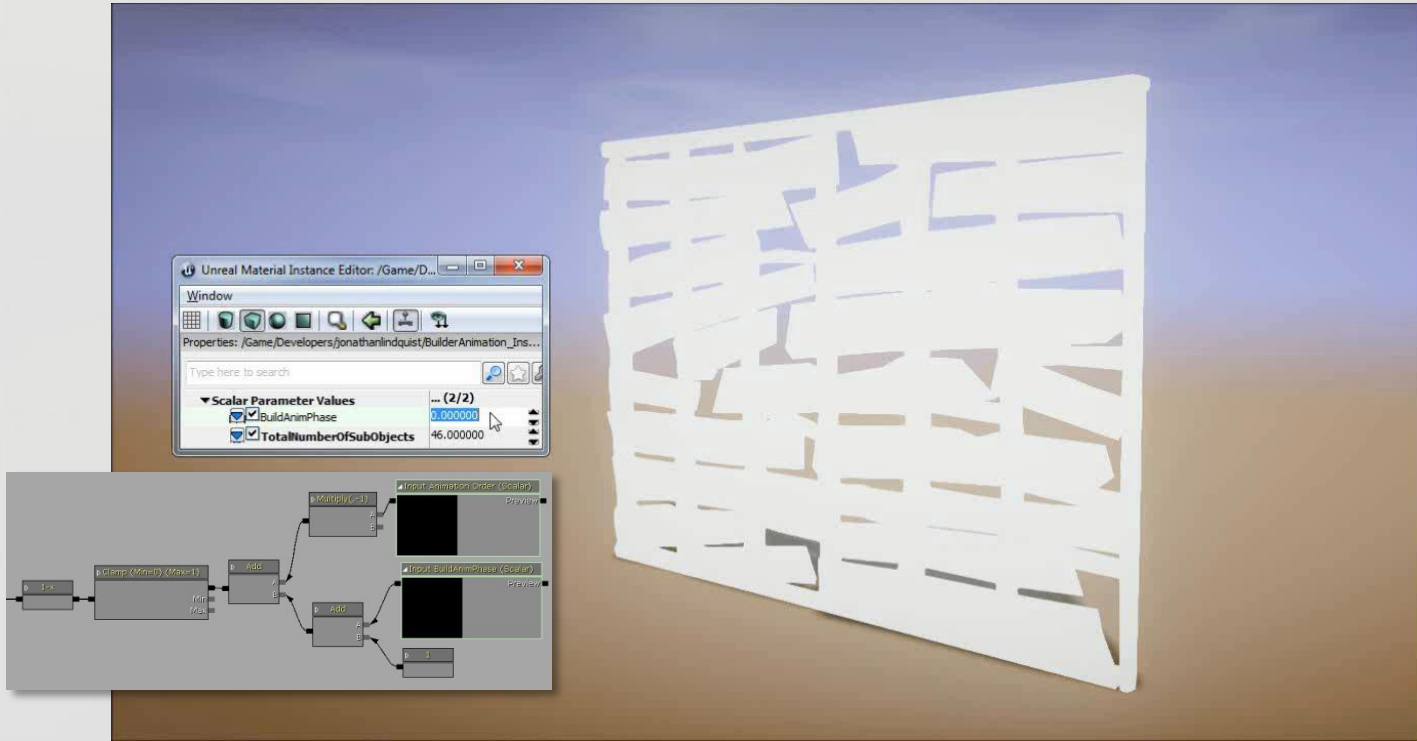
Self-Building Structures : Animation



- Scripting
- **Model Transformations**
 - Translations
 - **Rotations**
- Animation
 - Secondary motion
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Self-Building Structures : Animation

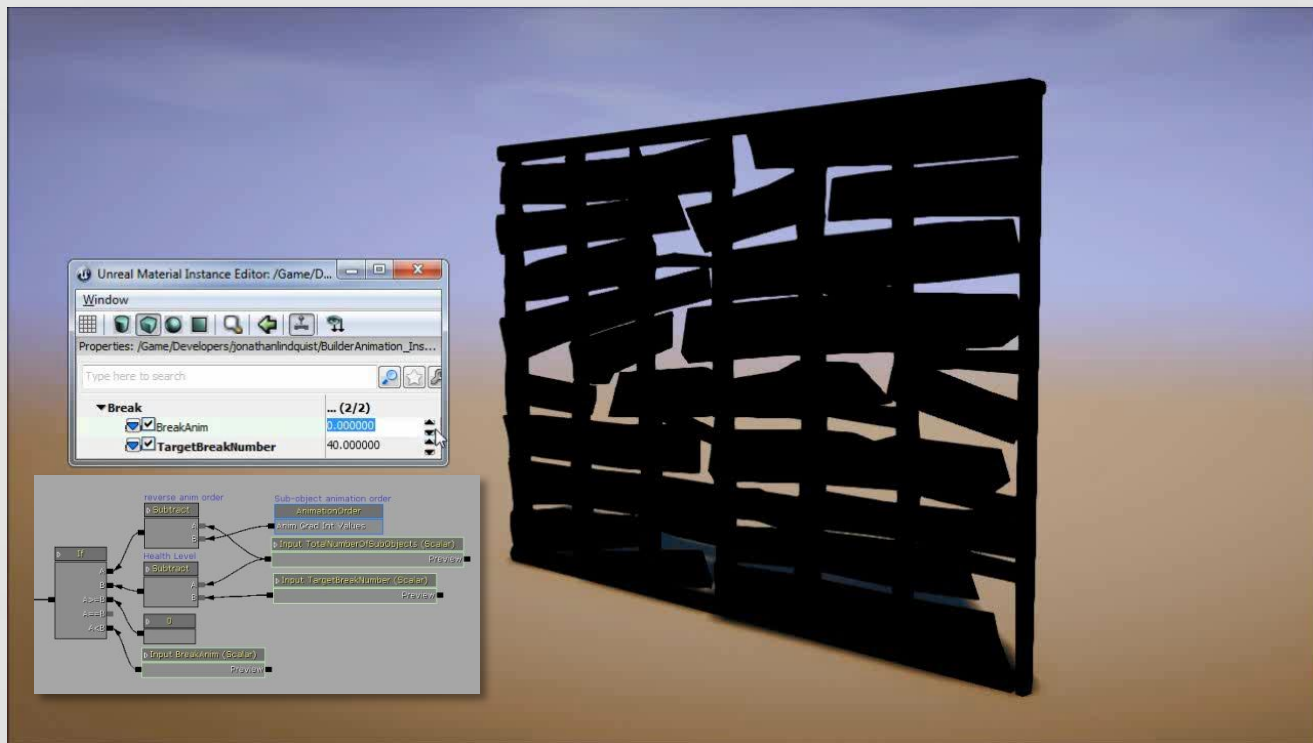


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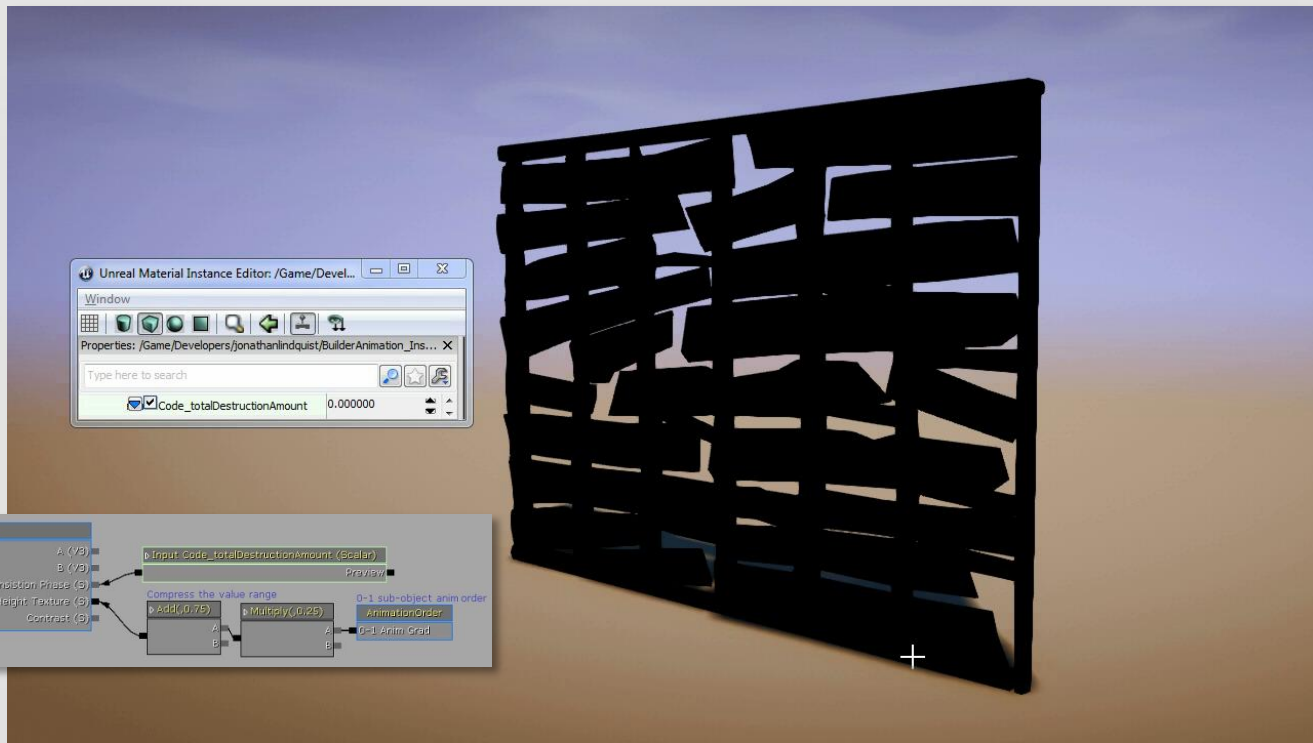
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Self-Building Structures : Animation



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Self-Building Structures : Animation

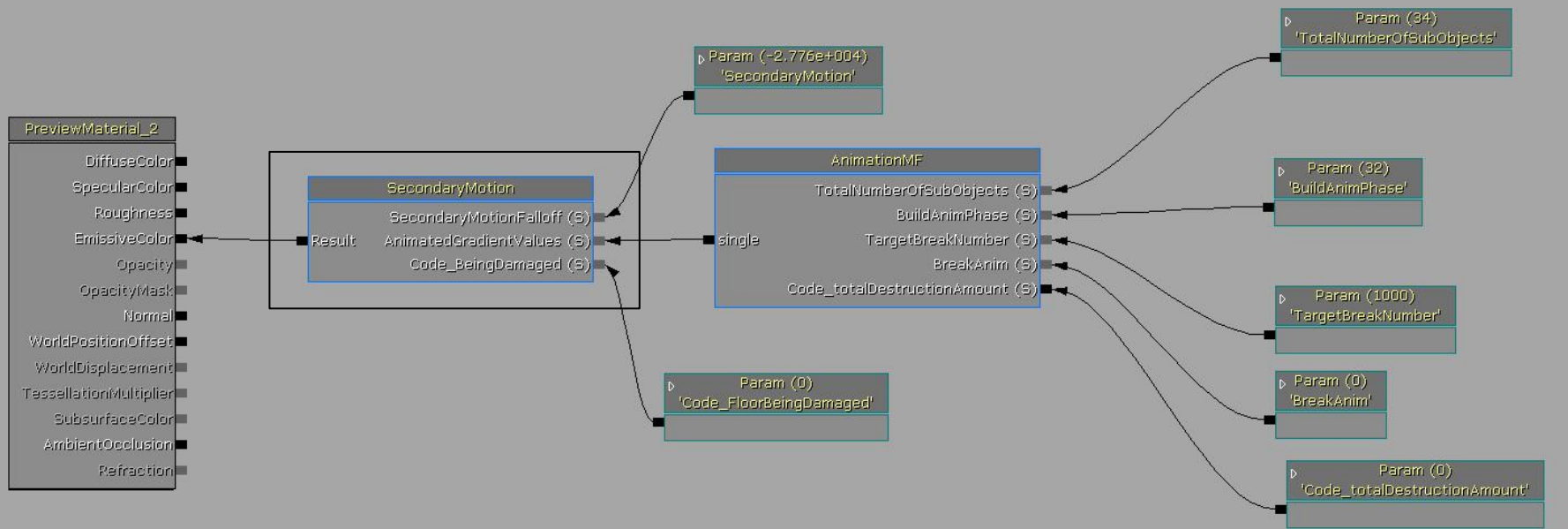


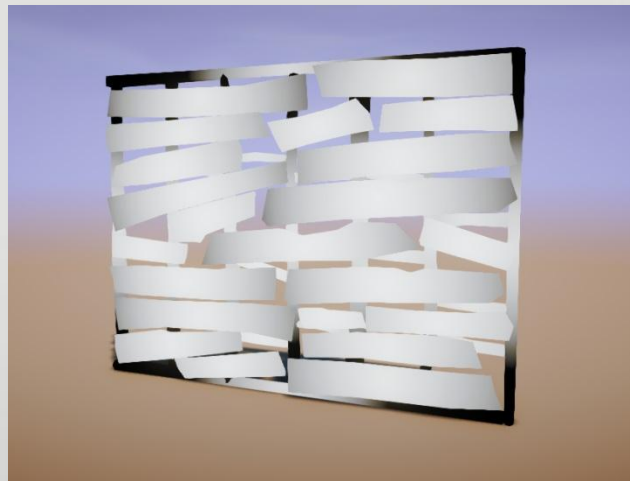
Self-Building Structures : Secondary Motion



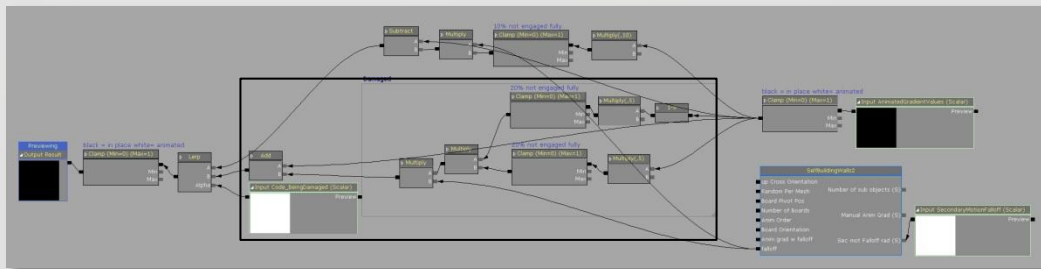
- Scripting
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- **Animation**
 - Secondary motion
- Masking

Self-Building Structures : Secondary Motion

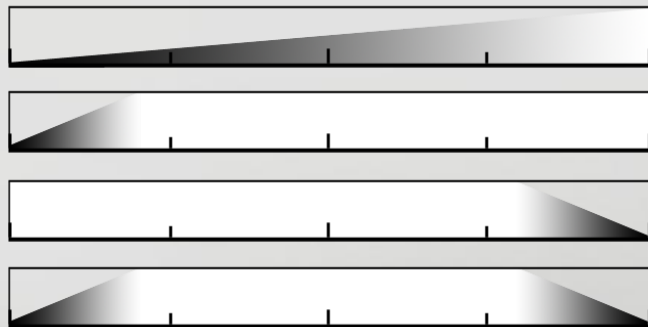




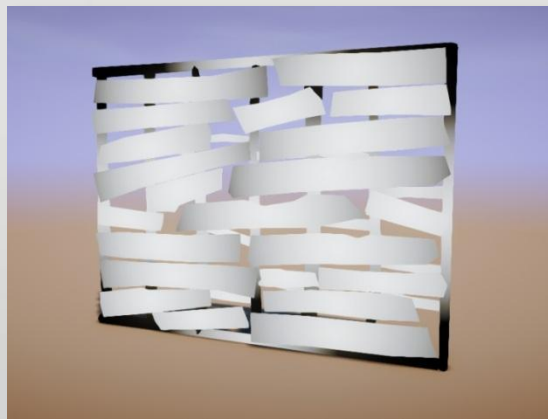
Self-Building Structures : Secondary Motion



Final Anim= (Anim Gradient * 3D Falloff) + previously calculated Anim



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Self-Building Structures : Secondary Motion



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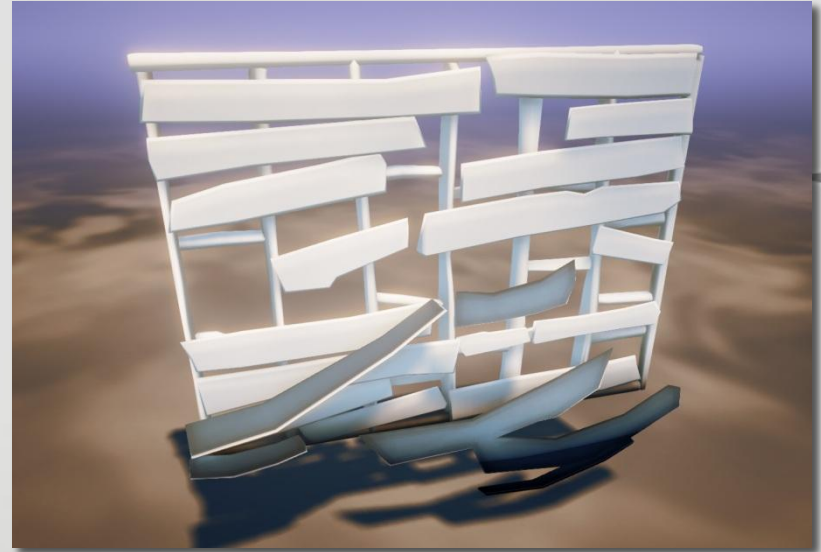
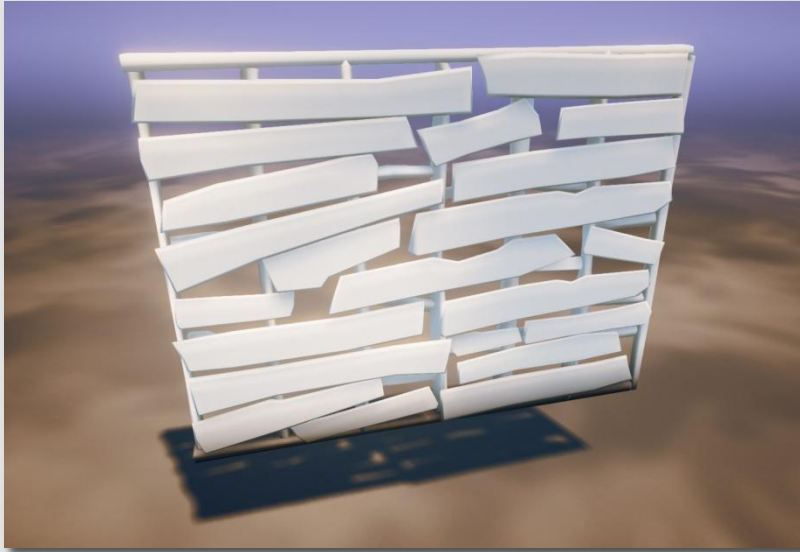
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Self-Building Structures : Secondary Motion



- Scripting
- Model Transformations
 - Translations
 - Rotations
- **Per-board animation**
 - **Secondary motion**
- Masking

Self-Building Structures : Masking



Masking value = clamp ((Z test + (1-current animation value)),0,1)



Notes:

- **Collision**
- Bounding Box
- Performance
- Normals



- Bounce effects
- Stylized culling
- **Self-building structures**
- Conclusion



Conclusion:

- **Cost effective**
- Unique capabilities
- Gameplay limitations



Questions?

Jonathan.Lindquist@EpicGames.com



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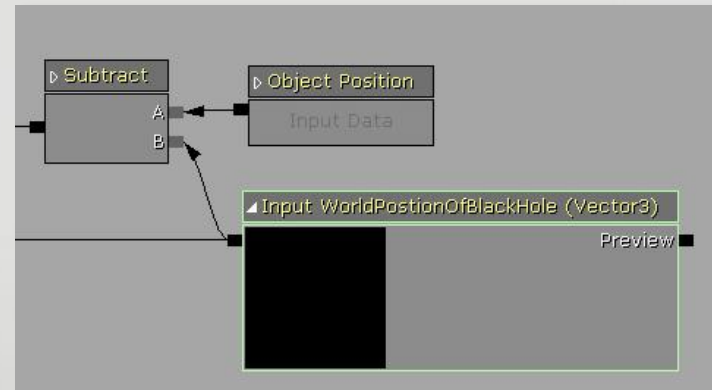
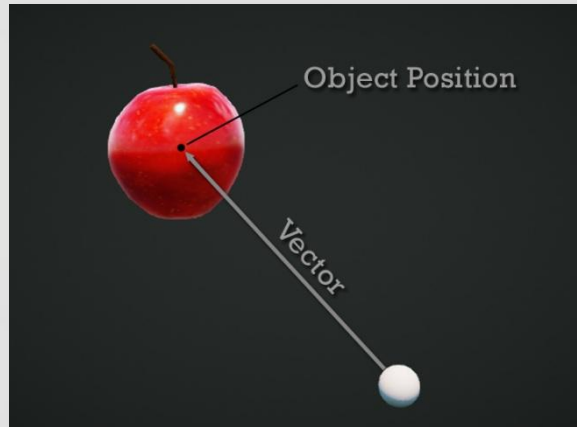
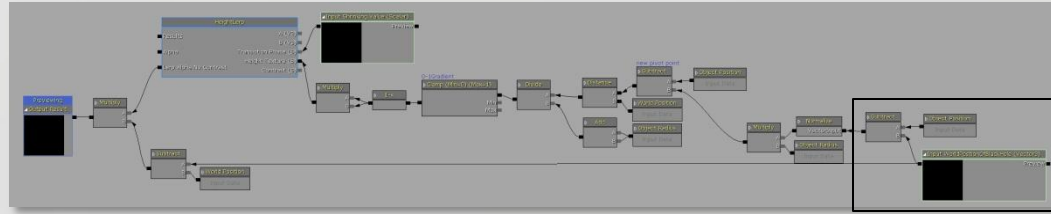
Fortnite's Vertex Shaders
Backpack Effect



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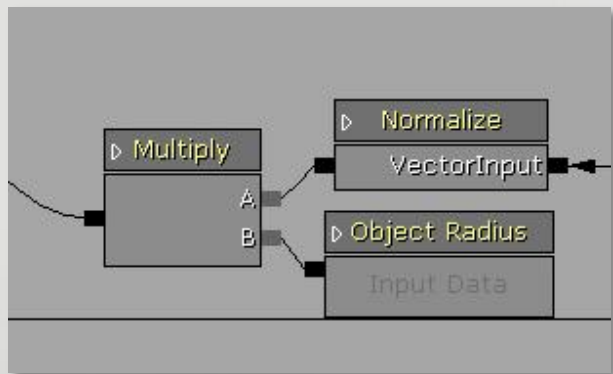
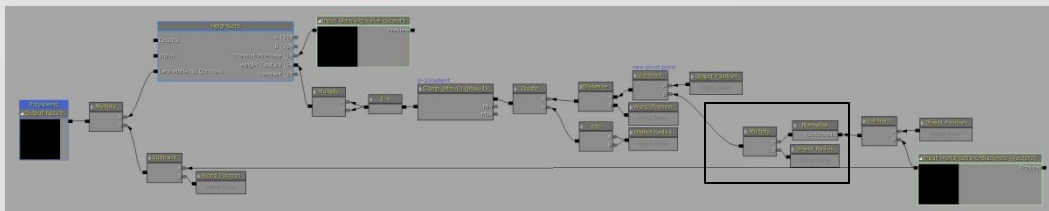
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Fortnite's Vertex Shaders Backpack Effect

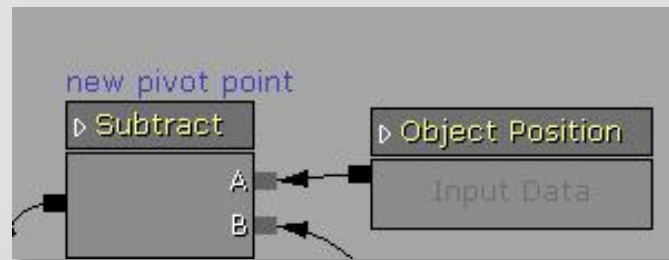
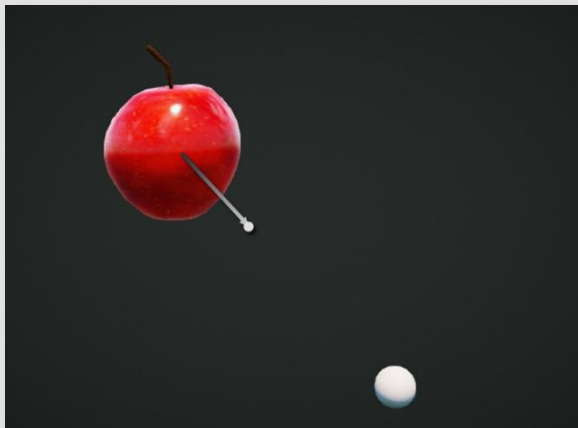
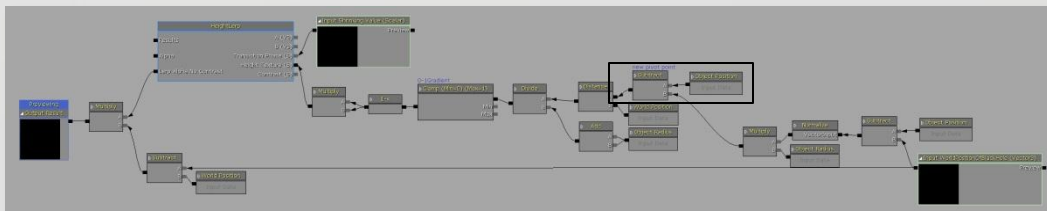


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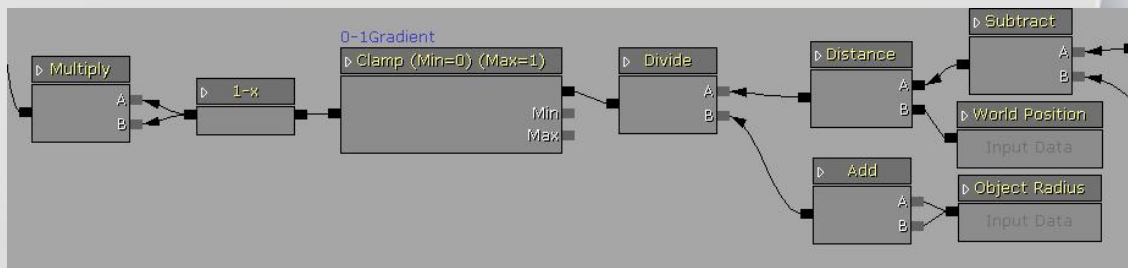
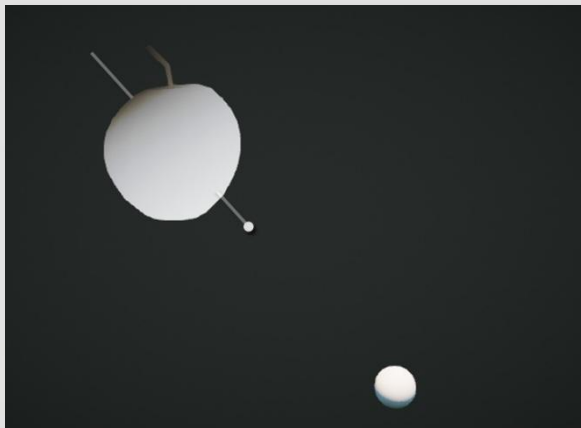
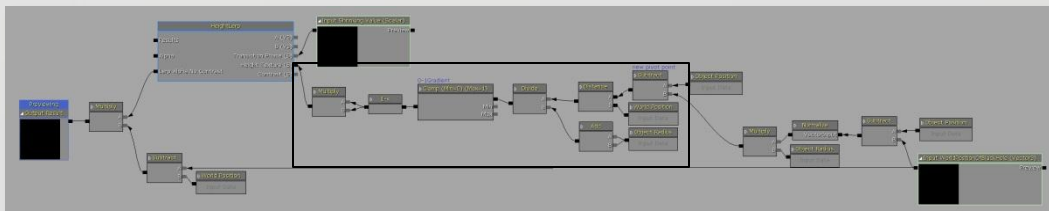
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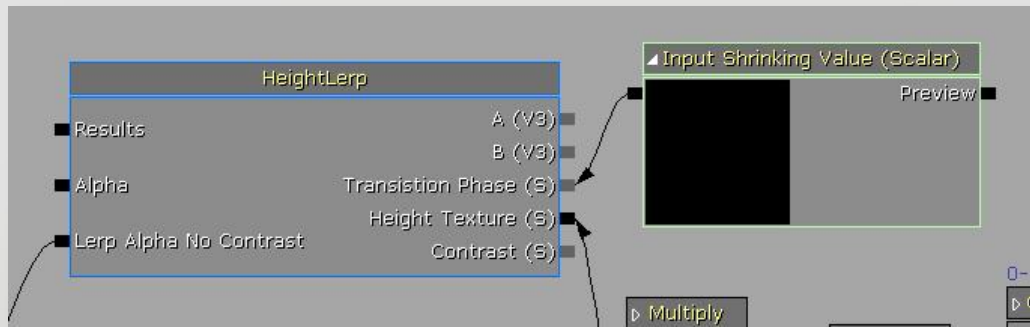
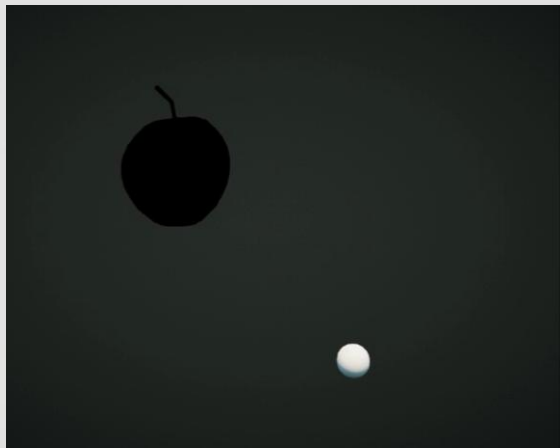
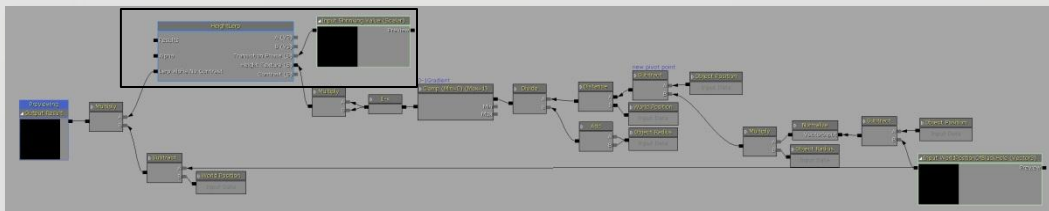


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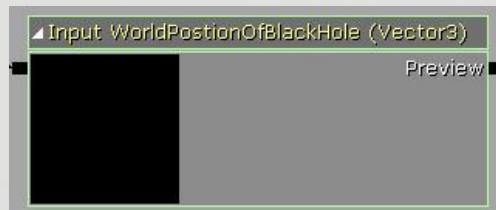
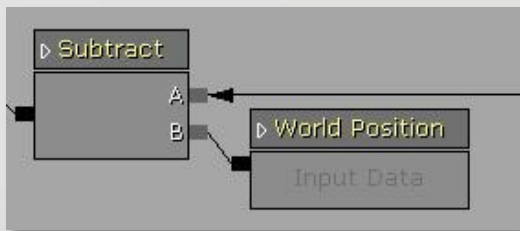
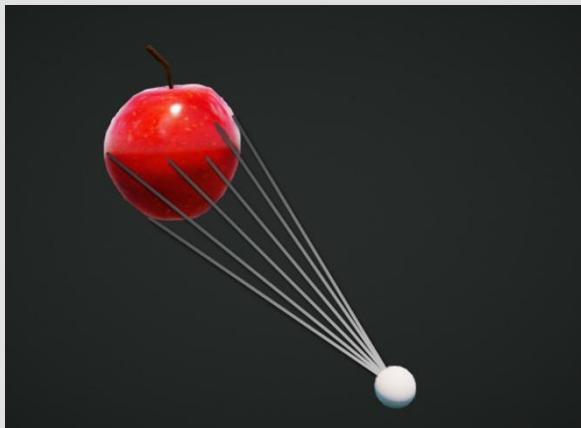
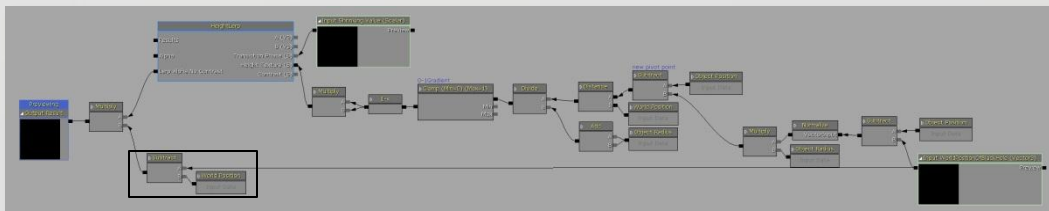
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